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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/575,237	05/22/2000	Hiroyuki Akashi	P00,0483	1992

26263 7590 05/05/2004

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EXAMINER
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CHANEY, CAROL DIANE

ART UNIT	PAPER NUMBER
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1745

DATE MAILED: 05/05/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b> <i>JK</i>	
	09/575,237	AKASHI ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Carol Chaney	1745	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 31 December 2003.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-38 is/are pending in the application.
- 4a) Of the above claim(s) 11-38 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

***Continued Examination Under 37 CFR 1.114***

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 07 January 2004 has been entered.

***Claim Rejections - 35 USC § 103***

Claims 1-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pendalwar et al., US Patent 5,716,421 with evidence shown by Spotnitz et al., US Patent 6,322,923 for reasons of record.

Pendalwar et al. disclose a battery which includes a lithium intercalation material cathode (14), a carbon anode (12) and an electrolyte system (26). (Note column 3, lines 24-40 and 51-64.)

The "electrolyte system" disclosed by Pendalwar et al. includes an inert phase (28) which is equivalent to applicants "separator". Pendalwar further discloses absorbing phases (30, 32) which are equivalent to applicants' solid electrolyte comprising a mixture of a polymer and a swelling solvent. The inert phase disclosed by Pendalwar et al. may include porous polyolefins such as polyethylene or polypropylene. (Note column 4, lines 33-41.) As shown in Pendalwar Figure 2, layers 70 and 72 of the electrolyte system are absorbing or gel forming polymers. These absorbing or gel-

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forming polymers disclosed by Pendalwar et al. are identical to the "solid electrolyte" disclosed by the applicants. Both applicants and Pendalwar describe electrolytes which comprise a mixture of a polymer and a swelling solvent. Pendalwar describes a gel or solid polymer electrolyte which includes a polymer such as polyvinylidene fluoride (PVDF), (column 4, lines 42-58) and a solvent (a swelling solvent) which may be propylene carbonate (PC), ethylene carbonate (EC), diethyl carbonate (DEC), dimethyl carbonate (DMC), dipropylcarbonate dimethylsulfoxide, acetonitrile, dimethoxyethane, tetrahydrofuran, n-methyl-2-pyrrolidone (NMP), or acetone. (column 4, lines 9-14.) Because Pendalwar discloses a wide range of possible polymers which may be used in the invention, the disclosure of polyvinylidene fluoride is interpreted to include commercially available polyvinylidene fluoride/hexafluoropolypropylene copolymers such as Hylar, KF, Kynar and Kynar Flex polymers.

When the battery system taught by Pendalwar et al. is heated above a threshold temperature, (135 °C for polyethylene) one or more of the polymer support structure layers (54, 56, 58 of Fig. 2) will melt, thereby cutting off ionic conductivity in the battery. The battery impedance is therefore higher at 135 °C than it is at room temperature. (Note Figure 5.)

The disclosure of Pendalwar et al. differs from applicants' invention in that Pendalwar et al. do not recite specific thicknesses or porosities of porous separator, or inert layers. However, one of ordinary skill in the art would recognize separator thicknesses between 5 and 15 microns and porosities between 25 and 60% to be conventional in the art, as evidenced by Spotnitz et al., US Patent 6,322,923, column 2,

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lines 26-52. Thus, applicants' invention as a whole would have been obvious to one of ordinary skill in the art.

The disclosure of Pandalwar differs from applicants' invention in that Pandalwar does not recite a specific ratio of polymer to solvent in the electrolyte systems disclosed by Pandalwar. However, applicants' invention would have been obvious to one of ordinary skill in the art because one of ordinary skill in the art would recognize the ratio of polymer to solvent will effect the solubility and gelation of the polymer with solvent. Thus, the ratio of polymer to solvent is a result-effective variable. The discovery of the optimum of a result effective variable in known process is ordinarily within the skill of art. See, for example, *In re Boesch*, 205 USPQ 215 (CCPA 1980)

### ***Response to Arguments***

Applicant's arguments filed 31 December 2003 have been fully considered but they are not persuasive.

Applicants assert Pandalwar does not teach or suggest a solid electrolyte battery that has a polyolefin film separator having a thickness of from about 5 $\mu$ m to about 15  $\mu$ m as well as a volume porosity of from about 25-60%. As discussed above, Pandalwar discloses polyolefin separators, and discloses both tri-layer and single layer polyolefin separators. A trilayer separator having polypropylene layers sandwiching a polyethylene layer is disclosed. Therefore, a polyolefin film separator is disclosed. (column 4, lines 38-41.) While Pandalwar does not specifically disclose a separator thickness of from about 5 $\mu$ m to about 15  $\mu$ m and a volume porosity of from about 25-

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60%, these parameters for lithium battery separators are conventional in the art, as evidenced by Spotnitz et al.

Applicants assert Pandalwar also does not teach or suggest a solid electrolyte battery having an impedance greater than the impedance realized at room temperature when the temperature of the solid electrolyte battery is from about 100°C to about 160°C. However, as shown in Pandalwar Figure 5, the impedances of both batteries Pandalwar tested are higher from about 100°C to about 160°C than at room temperature.

Applicants assert Pandalwar also fails to teach or suggest a solid electrolyte battery wherein the solid electrolyte is comprised of a mixture of a polymer and a swelling solvent present in a ratio of from about 1:5 to about 1:10. As discussed above, the ratio is a result effective variable, which would be within the skill of the ordinary artisan to adjust. Applicants' invention would have been obvious to one of ordinary skill in the art based upon the disclosures of Pandalwar and Spotnitz.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Carol Chaney whose telephone number is (571) 272-1284. The examiner can normally be reached on Mon - Fri 8:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Carol Chaney  
Primary Examiner  
Art Unit 1745

1 May 2004